AN

# ACCOUNT

OF THE

# EIDOURANION;

OR,

# TRANSPARENT ORRERY;

INVENTED BY

A. WALKER,

*Of George-ſtreet, Hanover Square;*

AS LECTURED UPON BY HIS SON,

W. WALKER.

*Stars teach as well as ſhine!* YOUNG.

*Os homini ſublime dedit; cœlumque tueri*
*Juſſit, et erectos ad ſidera tollere vultus.*
OVID MET. 1. 85.

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# DESCRIPTION

OF THE

# EIDOURANION;

OR,

## TRANSPARENT ORRERY.

THIS elaborate Machine is 20 feet diameter; it ſtands vertical before the Spectators; and its globes are ſo large, that they are diſtinctly ſeen in the moſt diſtant part of a theatre. Every Planet and ſatellite ſeems ſuſpended in ſpace, without any ſupport; performing it's annual and diurnal revolutions without any apparent cauſe. It is certainly the neareſt approach to the magnificent ſimplicity of nature, and to its juſt proportions, as to magnitude and motion, of any Orrery yet made: and beſides being a moſt brilliant and beau-

tiful ſpectacle, conveys to the mind the moſt ſublime inſtruction; rendering aſtronomical truths ſo plain and intelligible, that even thoſe who have not ſo much as thought upon the ſubject, may acquire clear ideas of the laws, motions, appearances, eclipſes, tranſits, influences, &c. of the planetary Syſtem.

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## SCENE I.

As information is the primary object of this lecture, it is thought more uſeful to exhibit PARTS of the ſolar ſyſtem, ſeparately, before a grand diſplay was made of the whole. This ſcene therefore, opens with only the Sun and the Earth. The Sun ſeems ſuſpended in the middle of the ſyſtem, and by ſpots on his face, is ſeen to turn round on his axis in 25½ days; light iſſues from his orb in all directions; in the blaze of which is ſuſpended the Earth, turning on its axis to produce day and night, and revolving round the Sun to produce the ſeaſons: its axis inclines 23½ degrees from a perpendicular to the plane of its orbit; and by that axis keeping parallel to itſelf during this annual journey, the

the northern and ſouthern hemiſpheres are alternately addreſſed to the Sun, ſhewing when 'tis ſummer in one 'tis winter in the other, and *vice verſa*. This ſcene ſo naturally exhibits the cauſe of day, night, twilight, ſummer and winter, ſpring and autumn, long and ſhort days, &c. that a bare inſpection of the Machine is ſufficient to convey the cleareſt idea of theſe phænomena.

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The Earth in this ſcene ought to be unſhackled with meridians or parallels of latitude: to be a free and independent ball, with land and water repreſented as they would appear to a diſtant ſpectator looking at the real Earth. But as globes are ſeldom ſeen without theſe appendages, a globe of two feet in diameter, equipped with meridians and parallels of latitude (being requiſite for illuſtration) will perform a diurnal and annual motion round the Sun, and explain the above phænomena on ſo large a ſcale, that their effects on the ſmalleſt iſland may be ſeen from the moſt diſtant part of the theatre.

This ſcene is ſurrounded by tranſparent paintings of the twelve ſigns of the Zodiac, ſhewing how the Sun, or rather the Earth, enters and paſſes thro' Aries, Taurus, Gemini, Cancer, &c.

Auxiliary ſcenes accompany this, to ſhew the principles of planetary motion; the oblate figure of the Earth; how ſhips and mountains appear at ſea; with ſhips moving round a large globe, &c.

## SCENE II.

Conſiſts of the Sun, the Earth, and the Moon. The object of this ſcene is to diſplay the cauſe of the waxing and waning of the Moon, and of ſolar and lunar eclipſes: for this purpoſe the Earth performs its annual and diurnal motions, and projects a conical ſhadow oppoſite to the Sun during its journey round him. The Moon borrowing her light from the Sun, and performing her rotation round the Earth every 29d. 12h. 44m. will ſometimes ſhew us more and ſometimes leſs of the enlightened part of her body: hence, when ſhe is between the Earth and the Sun, her dark

dark ſide is towards us, and we loſe ſight of her; and call this part of her period the CHANGE; but as ſhe revolves round the Earth from Weſt to Eaſt (the ſame way the Earth turns on its axis) in a few days we ſee her above the Sun in the Weſt, and, ſeeing a ſmall part of her enlightened face, call the appearance the Horned, or New Moon: (for her dark ſide receiving no reflection of light from any neighbouring body, cannot be ſeen except in very clear weather). As ſhe proceeds on her monthly journey, when the Sun ſets in the Weſt, we ſee her near our meridian, and then ſhe appears an HALF Moon, and we ſay ſhe is at the firſt quarter; as ſhe approaches the FULL, more of her enlightened face may be ſeen, and ſhe aſſumes an OVAL or GIBBOUS appearance. At the full ſhe is oppoſite to the Sun, when the inhabitants of the Earth look at her in the ſame direction as the rays of that luminary, and of courſe ſee the whole of her enlightened face. In performing the other half of her journey, ſhe wanes; and expoſing leſs and leſs of her enlightened ſide to us, again diſappears.

This

This ſcene receives alſo auxiliary illuſtration, before the grand ſcene opens, and in maps of the Moon during its exhibition.

In the twelve revolutions ſhe will make while the Earth travels round the Sun, it will evidently appear that the Earth is a moon to her; that ſhe does not ſhine by her own light; that ſhe has no diverſity of ſeaſons; that ſhe turns on her axis every 29½ days; that her ſurface is mountainous*; and that ſhe ſhines without ſetting, every ſecond fortnight, on the arctic or antarctic parts of our globe, during winter.

If the Moon moved in the ſame plane or level with the Earth, we ſhould have an eclipſe every full and change: but as ſhe travels 5¾ degrees to the north of it, and the ſame to the ſouth of it, every lunation, ſhe only croſſes the plane of the Earth's orbit in two places, which

* *Her mountains by ſome have been calculated nine miles high; but Dr. Herſchell's teleſcopes, which magnify* 6500 *times, have reduced her higheſt mountains to about* two *miles.*

points

points of interſection (called the Moon's nodes) though in a trackleſs path, move 19¾ degrees towards the weſt every year, and therefore paſs round the Heavens in 18 years and 225 days; the golden number of our calendars. Hence, when one of theſe nodes is between the Earth and the Sun at the change, the Moon's ſhadow is thrown on the Earth, and ſhe eclipſes the Sun; and if ſhe comes to the full when either node is oppoſite to the Sun, ſhe falls into the Earth's ſhadow, and loſes for a ſhort time her borrowed light: hence, as ſhe moſtly paſſes above or below the Earth's ſhadow, we have eclipſes very ſeldom. Theſe phænomena are produced in the Eidouranion as they are in nature, and perfectly evident on inſpection.

## SCENE III.

This ſcene alſo conſiſts of the Sun, the Earth, and the Moon. But the intention is to ſhew how the Earth and Moon agitate each other round their common centre of gravity, cauſing two tides every 25 hours. The Earth's THREE-FOLD motion appears in this ſcene:

ſcene:—that, on it's axis, to produce day and night; that, round the Sun, to produce the year and our ſeaſons; and that, round the centre of gravity with the Moon, to produce ſpring and neap tides, by their combined and oppoſite influences. The Moon is ſo near the Earth (240,000 miles at a medium) in compariſon of the Sun (near 100 millions of miles) that the Moon's attraction on the waters of the ocean and on the air of our atmoſphere (for there are tides in both) is to that of the Sun as 10 is to 3. So at the change of the Moon, the attraction of the Sun and Moon being in the ſame direction, a power of 13 influences the ſea, and we have SPRING tides; but at the quarters of the Moon, the two luminaries counteract the attractions of each other, ſo the Sun's power of 3 being taken from the Moon's of 10, leaves only 7 operating upon the ſea, and NEAP tides take place.

A tumbler filled with water, may be whirled by a ſtring vertically round the head, without any danger of the water falling out of it. Thoſe parts of the Earth that come ſucceſſively OPPOSITE to

to the Moon, perform a much larger circle round the centre of gravity, than the parts immediately UNDER the Moon: hence the waters oppoſite the Moon are THROWN OFF, as it were, by their centrifugal motion, and riſe above the common level, as well as the waters expoſed to the Moon's immediate attraction; thus two tides are produced in 25 hours, oppoſite to each other; and by the earth turning through thoſe protuberances, its waters riſe and fall.

The Sun would produce two ſmall, but ſimilar tides, if the Earth had no Moon; therefore the Sun's centrifugal tide being reinforced by the Moon's attraction, when ſhe is at the full, and the Moon's centrifugal tide being alſo aſſiſted by the Sun's attraction, when the Moon is at the change, ſpring tides take place at both theſe points of the revolution of the Moon round the Earth.—N. B. *This ſcene alſo receives collateral aſſiſtance.*

SCENE

## SCENE IV.

This diſplays the whole Copernican or Solar Syſtem, with every planet and ſatellite in diurnal and annual motion! With awe and deference I deſcribe this daring but humble tranſcript of creation! Enough, if one idea can be added to the ingenuous mind of the attributes and perfections of the Deity.

The Sun, a huge globe of fire (near a million times as large as our Earth, and intended to give light, heat, and vegetation to ſeven primary and at leaſt fourteen ſecondary worlds) is placed in the center of the ſyſtem; and by ſpots on his diſk is diſcovered to turn on his axis in about 25 of our days. Theſe ſpots cannot be permanently fixed, becauſe they are frequently altering in their ſhape, ſituation, number, &c. tho' ſome have ſuppoſed they have ſeen ſmall indentations on the edge of the Sun, as the ſpots have paſſed it, and conjectured that a fluid matter ſurrounding a dark nucleus, which ſometimes became bare, might occaſion the tranſient appearance and diſappearance of the ſpots.

MERCURY is the firſt planet in the order of the ſyſtem; he moves round the Sun with the greateſt velocity of any of the Planets familiar to our ſyſtem (as being neareſt the Sun) in about 88 of our days; but the angle of his diſtance from the Sun, as ſeen by us, is ſo ſmall, that unleſs by the teleſcope, we can ſeldom diſcern him; (and even then an equatorial inſtrument to direct it to its place, as indicated by the Ephemeris, will be requiſite;) and when we do, it is for ſo ſhort a time, and in twilight, that we can diſcover no ſpots on his face, and therefore to this hour know nothing of the length of his days and nights: we ſee him partially enlightened like the Moon, and are therefore certain he derives his light from the Sun, as ſhe does; ſo that no doubt he is a fellow world, with inhabitants adapted to the heat of his ſituation. He is not much larger than the Moon. Our Earth viewed from Mercury muſt appear much larger and more luminous than any of the Planets, except Venus, appear to us.

VENUS is the next planet in the order of the ſyſtem, and diſtinguiſhed by her *ſuperior brilliancy*; ſhe is a little more than twice the diſtance of Mercury from the Sun: is near as large as the Earth; and moves round the Sun in 224½ of our days. The ſpots on the diſk of Venus, however, are ſo ill defined, that we are far from certain as to the length of her days and nights. When ſhe is to the Weſt of the Sun, ſhe is a morning ſtar; when to the Eaſt of him, an evening ſtar: her orbit or track is included by the Earth's, and as both move the ſame way, ſhe appears to be on one ſide of the Sun longer than the 224½ days ſhe is in going round him. The axis of Venus is ſaid by ſome aſtronomers to incline 75 degrees to the axis of her orbit: and therefore her ſeaſons vary very faſt, the ſun paſſing over more of her from pole to pole in one day than over the Earth in a quarter of a year. Hence the heated places of this planet have time to cool, which ſuggeſts to our ideas that proviſion has been made for inhabitants, that they might not ſuffer by their vicinity to the Sun; this circumſtance alſo gives her two winters

and

and two ſummers at her equator, and indicates her inhabited. The diſcovery lately made by Mr. Schroeter, of a light faintly extended beyond the bounds of direct ſolar illumination, when ſhe has her falcated appearance like the Moon approaching to her quarters, ſtrengthens this probability: as theſe are ſigns of twilight and of an atmoſphere. This Aſtronomer has alſo obſerved her to have conſiderable mountains; another character of a globe ſuited for habitation.

The EARTH is the third planet in the order of the ſyſtem—but having devoted ſo much of this tract to its phænomena, as well as its ſatellite the Moon, we proceed to

MARS, known in the Heavens by his red and fiery appearance, and next above the Earth. This planet is but about one-fifth ſo large as the Earth; is about 150 millions of miles from the Sun, and goes round him in ſomething leſs than two of our years. His days and nights together have been conſidered, till lately, about 40 minutes longer than

ours*; and he has no variety of ſeaſons. When we paſs between the ſun and him, he has a moſt fiery and alarming appearance, and is often miſtaken for a comet; but when we are on the oppoſite ſide of our orbit, he appears ſmall, and ſcarcely to be diſtinguiſhed from a fixed ſtar.

JUPITER, far the largeſt of our planets, near a thouſand times the ſize of the Earth, is the next above Mars, at five times the diſtance from the Sun that we are; ſo that he enjoys but a twenty-fifth part of the light, heat, and attraction of that luminary we do.—Though indeed of the light and heat he may ſtill poſſeſs, we are not ſo certain as of the degree of attraction: that being invariably proportioned to the diſtance; while theſe will be relative to the denſity and other circumſtances of the atmoſphere, and the aptneſs of the ſurface of the planet to acquire and retain heat. He is attended with four ſatellites that revolve very regularly round him. The

* *According to the obſervations made by Dr. Herſchell on a large ſpot on the face of Mars*, his *diurnal motion is performed in* 23 *hours*, 39 *minutes*, *and* 22 *ſeconds.*

three

three first are eclipſed every revolution, and every ſeventh day come in conjunction with him and one another, as may be ſeen on the *Eidouranion*. Longitude at land, can be aſcertained by the eclipſes of Jupiter's ſatellites, as well as by a tranſit of Venus; and theſe would ſuperſede the neceſſity of a time-keeper, if they could be obſerved at ſea; hence, in the Nautical Almanack, theſe eclipſes are very exactly calculated for the meridian of Greenwich, and anſwer very good geographical as well as nautical purpoſes. Jupiter, though near twelve years in making his way round the Sun, turns round his axis in about ten of our hours, ſo that his days and nights are but five hours each: and he has no variety of ſeaſons; for his axis is perpendicular to the plane of his orbit. Turning ſo ſwiftly on his axis, his figure becomes more oblate than that of the Earth, being more than 6000 miles longer in diameter from one ſide of his equator to the other, than from pole to pole. This ſwiftneſs of his diurnal motion alſo draws his clouds and vapours into ſtreaks or lines over his equatorial parts, forming what is

called Jupiter's Belts. An eclipſe of the Sun, by this great planet, would be a ſtriking object even to the unaſſiſted ſight as viewed from Saturn.

SATURN, ſtill a more remote planet from the Sun, is calculated to be 949 millions of miles from him, and is near thirty years in going round him. Dr. Herſchell has lately diſcovered ſpots upon Saturn, and that they ſeem in motion, but has not from them yet aſcertained the length of his days and nights. A large, broad, double, and luminous ring ſurrounds him, inclining about thirty degrees to the plane of the ecliptic, and muſt appear like a great arch of light to his inhabitants: It keeps parallel to itſelf at all times, and is intended to reflect light on the planet; by which, with that reflected from his five ſatellites*, and the original light of the Sun, he is more enlightened than we ſhould be by two ſuch full Moons as ours; ſo no doubt he may have inhabi-

* *In addition to thoſe five,* two *have been ſince diſcovered by Dr. Herſchell.*

*The 2d revolving in* 1*d.* 8*h.* 53′ 9″
*The 1ſt in* — 22*h.* 40′ 46″
*Both nearer than any of thoſe before obſerved.*

tants

tants adapted to the darkneſs and coldneſs of his ſituation.

The GEORGIUM SIDUS, or Georgian Planet (ſo called by Dr. Herſchell, its ingenious and indefatigable diſcoverer) makes the ſeventh in the order of the ſyſtem; it is near twice Saturn's diſtance from the Sun, and will be near eighty-two years and ſix months in going round him; is of a pale colour, and much larger in its teleſcopic appearance than the fixed ſtars, being 100 times as large as the Earth; and, on a clear evening, is viſible to the naked eye. The Dr. has diſcovered two ſatellites to this planet, one revolves in $8\frac{3}{4}$, and the other in $13\frac{1}{2}$ days.

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Theſe we conſider as the regular bodies of our ſyſtem; ſo regular, indeed, that every phænomenon reſpecting them is calculated for years before hand, and it is almoſt conſidered as a criminal error to be a minute of time wrong in the calculation. But we are ſometimes viſited by Comets, which may alſo be recognized as a part of our ſyſtem: of theſe our knowledge is very imperfect.

By

By ſuppoſing that the ſame Comet has appeared at equal intervals of time; by obſerving that, like the planets, they deſcribe equal areas in equal times; and by having three points in an ellipſis given to make out its eccentricity; from theſe data it was natural for mathematicians to ſuppoſe they could calculate the return of all Comets that had been ſcientifically obſerved: but the actual return even of that conſpicuous one expected by Dr. Halley, does not ſeem ſufficiently aſcertained. As new Comets are almoſt perpetually appearing, on which calculation hitherto has been ſilent, there is reaſon to expect, in a proper period of time, an adequate number of obſervations to decide the queſtion, whether in general they revolve at ſtated times, or traverſe our ſyſtem without probability of return. Perhaps Comets of each deſcription time and obſervation may confirm to us. We know that Comets accompanied with tails come very near the Sun, and from all quarters of the Heavens! that the tails keep oppoſite * to the Sun; that

* *Conſequently they are only viſible to us when ſeen obliquely to the Sun. Thus the Comet of the be-*

that, like electrical and borealean light, they do not refract the light of the fixed ſtars, &c. That of the year 1680 was tremendous! Its appearance is copied in the *Eidouranion*. It deſcends from the top of the machine; its train increaſing in length and luſtre till it arrives at the Sun, diminiſhing as it aſcends. Its orbit is ſo eccentric that the ſmall part of it viſible, is not ſenſibly to be diſtinguiſhed from the parabolic curve; and in this repreſentation it finally diſappears in the roof of the theatre; it being impoſſible, if its return were aſcertained, to repreſent the extent of ſuch an orbit, and its motion in it, with any degree of ſuitable proportion. The velocity of ſuch of theſe as approach neareſt to the Sun, particularly of the Comet of 1680, exceeds any ſwiftneſs that falls within obſervation; except that of the rays of light; it being nearly 2000 times greater than the ſwiftneſs of a cannon-ball, at the inſtant of its diſcharge; yet ſcarcely a thouſandth part of the velocity of

*beginning of this year, 1793, was obſerved to have little or no train during any part of its appearance; but a faint hazy light diffuſed round it.*

light

light paſſing from the Sun*. Theſe amazing viſiters, whom philoſophy contemplates with awe very different from that terror with which ſuperſtition had long viewed them, moving in ſuch amplitude of ſpace, ſo numerous as they are, and ſo great as ſome of them, muſt have functions aſſigned to them proportionally important: either occaſionally of terrific revolution; or more generally of recruiting the atmoſphere of the planets in their ſucceſſive appulſe to any of them, and ſupplying the diminution of the ſolar fires. Perhaps too they are uſeful in preventing the central tendency of the planets to the Sun, from increaſing more than in a certain degree: ſo that the apparent diſturbances, thus produced, will be part of the neceſſary order and harmony of the ſyſtem.

It is probable (though their orbits are ſo much oblique in all directions to thoſe of the planets, that it can rarely

* *The velocity of a cannon-ball is about* 8 *miles per minute.*

| | |
|---|---|
| *Of the Comet in its perihelion* - | 14,600 |
| *Of Light* - | 12,000,000 |

hap-

happen) that Comets may be inſtrumental to great ſhocks: either by direct colliſion, the effect of which, conſidering the velocity and maſs of ſome of them cannot be eſtimated, or by near approach: and of this latter a poſſible reſult, and ſuch as ſeems, in one inſtance at leaſt, to have already taken place, is noticed in the remarks annexed to this account of the *Eidouranion*. But the philoſophic obſerver will have this reflection preſented to him from the phænomena of the Univerſe; that the apparently diſturbing and deſtructive powers are ſecondary and ſubſervient; while thoſe of the preſerving and meliorating kind, are primary, continued, and univerſal. And thoſe incidental cauſes of a melancholy and diſtreſſing aſpect, when reſolved into their ultimate tendency and neceſſary effects, manifeſt themſelves, in ſo far as we can trace them, to be parts eſſential to the ſyſtem of pure and perfect benevolence.

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But when we launch in idea into infinite ſpace, and contemplate the ſyſtems without number that fill it; here indeed we have a ſubject truly worthy of the

DEITY!

DEITY! Whoever ſuppoſes the fixed ſtars placed in a concave ſphere, as they appear to us, muſt have a narrow and contracted idea of the SUPREME BEING; for one ſtar appears large and another ſmall, becauſe one is immenſely diſtant from us in compariſon of another. By teleſcopes we formerly could ſee three times the number we can by the naked eye; and now teleſcopeshaving received further improvement, 30,000 *fixed ſtars are diſcovered!** And why may not ſtars be ſo remote, that their light may not have reached the Earth even ſince the creation! The Sun's light could not

* *Through Dr. Herſchell's large teleſcope many fixed Stars appear double; the Polar Star is double (but they are only ſtars at different diſtances from us appearing nearly in the ſame line.) Some appear like a topaz, others azure, others red; all are round, and many as perfectly defined as a ſhilling is on black cloth. The ingenious Dr. Hornſby diſcovers that Arcturus, and ſeveral others of what we call fixed Stars, have a progreſſive motion, and that they are very differently ſituated in reſpect to one another to what they were even in Flamſted's time. So that it is probable ſyſtems may revolve round ſyſtems; that our Sun himſelf is in motion, and carries his ſyſtem of worlds along with him. Many fixed Stars have been diſcovered to turn on their axes.*

reach

reach the fixed ſtars, and be reflected back with ſuch luſtre; of courſe they ſhine by their own light—if ſo, they ſhine as our Sun, conſequently are Suns themſelves*. Now, as a principle of uniformity runs through the variety of nature, it is reaſonable to conclude theſe Suns to be centres of ſyſtems like ours; and deſtined for the ſame noble purpoſes, viz. that of giving light, heat, and vegetation to various worlds that revolve round them, but which are too remote for diſcovery, even with our beſt tele-

* *Agreeably to this, Dr. Herſchell has noticed ſingle nebulous Stars ſurrounded with a faint equable whiteneſs; ſuch as a ſyſtem of Planets viewed at that diſtance from us might be ſuppoſed to give: others he has ſeen, which have the appearance of yet unformed ſyſtems. And there are, we may preſume, points of view in the immenſity of the Univerſe, in which all the fixed Stars, acceſſible to the eye or teleſcope from this ſtation of ours, and all the inconceivable ſpace, through which they extend, vaniſh into a* nebula, *and almoſt an indiſcernible point. Such is the order and greatneſs of that Empire, which theſe Diſcoveries, the farther they are purſued, muſt for ever more and more preſent to our increaſing admiration. Such the relation of parts ſo aſtoniſhingly remote! Such the unity of intelligence, power, and preſerving goodneſs which pervades the whole.*

 ſcopes!

ſcopes! This idea is infinitely too great for the human mind; or indeed for that of any created Being! For how inadequate muſt the utmoſt ſtretch of finite faculties be to repreſent infinity! The ſtars, diſpoſed in conſtellations, and ſurrounded by concentric circles, may perhaps aſſiſt the imagination a little: The attempt in Scene V. if not admired, we hope will be forgiven. But was it poſſible we could actually take our flight into infinite ſpace, or be borne on the wings of lightning, to the moſt diſtant fixed Star we can now ſee, even there, perhaps, we ſhould find ourſelves on the confines of creation, and ſee as many Stars before us as we left behind! For ſpace has neither top nor bottom in it: It is a circle whoſe center is every where, but whoſe circumference is no where! Even ſyſtems themſelves may have revolutions round one another; for new Stars appear, riſe into magnitude, and then diminiſh and diſappear. Stars of the *firſt* magnitude, in Flamſted's time, dwindle into thoſe of the *third* or *fourth*, in our time; as is the caſe with Aldebaran

baran and others. Some of the Stars change their magnitude periodically: as Algol, in Meduſa's Head, which riſes from the third magnitude to the ſecond, in two days and twenty-one hours.—Where ſuch periodical diſappearances are ſhort, they have been referred with probability to quick revolutions of ſuch ſtars on their axis, with part of their diſk opaque; or to the regular intervention of ſome very conſiderable Planet to intercept them from us. But reappearances of this kind, after very long intervals, would indicate rather a revolution in a great orbit. By analogy we conclude, that at a proper diſtance our Sun would dwindle into a fixed Star among the reſt, and his ſyſtem of worlds diſappear. Now as we ſee that almoſt every particle of our globe ſwarms with life and animals, we cannot ſuppoſe the other bodies of our ſyſtem to be only intended as a faint ſpangle for mortals to gaze at, more eſpecially as they are as well calculated for inhabitants as ours, revolving as regularly round the ſame Sun, and ſeeming to have every other convenience for rational and brute inhabitants. But to carry this idea into in-

finite ſpace; to recognize Suns and Syſtems above us, below us, to the Eaſt, the Weſt, the North, the South; to conſider each Sun as the centre of a ſyſtem like ours, and every world inhabited!—In ſhort, the aſtoniſhed fancy turns round, and is entirely loſt and ſunk in the abyſs of nature! Well might the Pſalmiſt ſay, that "The hea-" vens declare the glory of God, and the " firmament ſheweth his handy work." Well might he expreſs himſelf as overwhelmed with the idea of the power and omnipreſence of the Deity; ſince all our diſcoveries ſerve only to convince us, that a progreſs of inexpreſſible extent, continued through ages without number, would find us every where, as here, ſurrounded with his infinite energy;—eternity, and immenſity, filled with his vital preſence.

DIS-

# DISSERTATION

ON THE

# PROBABLE CAUSE

OF THE

# DELUGE.

SO perfect are the laws by which this wonderful ſyſtem is regulated, and ſo effectual that Self-phyſic which the Almighty has inſtituted through all his works, that if any ſeeming diſorder happens in the ſyſtem, there requires no immediate interpoſition to prevent or cure the miſchief, each body carrying within itſelf the principles of preſervation and cure; an argument of wiſdom and foreſight worthy of the Deity!

The Planet Jupiter was attracted out of his orbit by the enormous Comet which appeared in the year 1680. The Comet coming acroſs the plane of his track, had a temporary influence upon him: and it is obſervable, he has not travelled by the

the ſame fixed ſtars ſince that period which he did before it; and no doubt but his uſual motion was momentarily retarded, and the ſhape of his orbit altered. Now if Jupiter conſiſts of land and water (and by the ſpots ſeen on his face it is more than probable) it is poſſible he might experience a revolution ſomething ſimilar to our flood; for that our flood was occaſioned by the near approach of a Comet, is a moſt natural ſuppoſition, and in no wiſe militates againſt the ſcriptural doctrine of that event: it being as eaſy, and as conſiſtent for the Almighty, to render juſtice by a ſecondary cauſe, as by an immediate interpoſition. Nor is his attribute of mercy arraigned by the promiſcuous deſtruction the deluge occaſioned; for it is evident, by reaſoning from his works, that he governs the univerſe by "general, not by partial laws."

The veſtiges of the deluge are ſo remarkable, both on the ſurface and within the bowels of the earth, that if examined without prejudice, they prove, I think, beyond a doubt, that awful revolution to have been the work of a

Comet. Not that the moiſture of its tail drowned the World, as was unphiloſophically ſuggeſted by Whiſton; but if the attraction of the Moon be capable of raiſing the water of the ſea above its common level, what effects might not be ſuppoſed from the nearer approach of a body perhaps many thouſand times larger than the Moon? If a tide by ſuch an attraction was raiſed three or four miles above the level of the Sea, the Earth, by turning on its axis, would have that protuberance dragged over the land, and its ſurface would be plowed up into thoſe inequalities we call mountains; for that mountains are not of eternal duration, is evident from their growing leſs, even in the memory of man. For every thing tends to a level. Rains falling on mountains waſh down their aſperities; this matter bemuds the rivers, and banks out the ſea; rocks themſelves yield up their fantaſtic forms to the effects of air, water, and heat; and land has been growing into the water ever ſince the deluge. But why ſhould all aſſemblages of mountains be arranged like little ridges of ſand on the ſea ſhore? Doubtleſs by having been produced by

a ſuperior tide, and left to dry by an unreturning ſea. Almoſt all great ranges of mountains run North and South; The Andes of the Cordelleras; the mountains of the Moon in Africa; the Dophranes, Caucaſus, Allegany, &c.— the Alps and Pyrenees excepted.

As Comets viſit our ſyſtem in all directions, why might not that in queſtion have its motion from North to South, and dragging the ſea after it, determine the mountains to thoſe points of the compaſs? From whence come the ſhells and fiſh bones we meet with on the tops of the higheſt mountains? We have not diſcovered any power in nature diſpoſed to work ſuch quantities of them through the bowels of the Earth; and indeed magination has not yet been ſo wild as to carry them thither: They are not a fortuitous aſſemblage of atoms aſſuming ſuch forms; not *luſus naturæ*, but *bona fide*, ſhells and fiſh-bones, ſuch as we meet with on the ſea-ſhore! We find them alſo deep buried in the bowels of the ground, far from the ſea; we find them in rocks, and often

ten converted into ſtone; nay, why may not the fat of fiſh, joined with vegetable ſubſtances, form the bitumen of coal? We have experiments that warrant ſuch a ſuggeſtion. Now if ever the ſea was dragged over the ſurface of the Earth by the attraction of a Comet, theſe effects muſt naturally follow.

In digging into the bowels of the Earth, we have ſtill ſtronger evidence that the flood was occaſioned by the near approach of a Comet. It is well aſcertained, that the united attraction of every atom of the Earth forms that Earth into a denſe ball, and not any particular attraction in its center.—All matter being therefore affected by this power in proportion to it's denſity, one might conclude that the heavieſt bodies would lie deepeſt, and the higheſt near the ſurface, but this is by no means the caſe: Coal is lighter than ſtone; various minerals lie upon light earths, &c. evidently proving, that the general order of nature has at ſome time been diſturbed, and the manner in which matter obeys the laws of gravity diſarranged.

Hence

Hence the philoſophic miner finds ſtrata of various denſity in digging downwards; and in purſuing his vein of ore, finds theſe ſtrata broken and divided; nay, if he loſes the vein, he can eaſily tell where to find it again, by the manner in which it broke off. In this he never is miſtaken: He ſees, as it were, through many fathoms of earth! Evidently ſuggeſting, that ſome revolution on the Earth has broken up its naturally arranged ſtrata, and introduced this "regular confuſion."

The various ſtrata of the Earth ſeldom lie on one another horizontally: they generally dip; and near the ſhore commonly incline towards the ſea. On the ſouth coaſt of England, the rocks incline ſoutherly; on the oppoſite coaſt of France they incline to the north. Is it not probable, that at the deluge, the horizontal ſtratum was broken between theſe countries: and the ends falling loweſt at the breach, formed the channel, into which the ſea flowed, when it loſt the influence of the Comet, and again obeyed the power of gravity? Countries ſeparated by narrow channels, univer-

univerſally have their ſhores inclining towards the ſea; ſhewing that the general geography was at that time altered.

It is true, we have an old doctrine revived, and ſupported by reſpectable authority, that mountains were formed originally by thoſe eruptions we call volcanos. The votaries of this theory pronounce the hollows and cavities on the tops and ſides of mountains, Craters, or the cups of extinguiſhed volcanos; and if the ſtone of the mountain be of a bluiſh colour, then it is declared Lava; and the proof of a volcano having exiſted there becomes incontrovertible! Hiſtory, however, affords us very few inſtances of mountains ſo formed. This doctrine has received very juſt authority from the laſt ſcientific Circumnavigators. The rocks which ſurround the iſlands of the Pacific Ocean, generally break off perpendicularly about a mile out at ſea, which makes their approach very difficult and dangerous; and as the ſtratum immediately under the loam of the ſurface has an aſhy, or lava-like appearance, the voyagers very naturally concluded, that the immenſe number of

ſmall

ſmall iſlands which ſtud that extenſive ocean, were the product of ſubaqueous eruptions. If I might be allowed to hazard an opinion againſt ſuch reſpectable authority, I ſhould rather apprehend that the Pacific Ocean had been once a continent, and that at the deluge, when the Earth's ſurface was diſarranged and broken up by the violent motion of the waters, the general body of it ſunk beneath the level, or was waſhed away to other parts, leaving only the more elevated and ſolid part remaining. For volcanos throw up matter piece-meal; iſlands, therefore, formed by them, would have a ſloping, or gradually ſinking ſhore: whereas the iſlands of the Great South Sea are ſurrounded by perpendicular rocks, that ſink in that direction to an almoſt unfathomable depth in the ſea. Beſides, how can we account for that ſimilarity of manners, cuſtoms, colour, and even language, among the inhabitants of iſlands ſo diſtant, that no mode of navigation they practiſe could ever make them acquainted, or have any communication with one another? If theſe iſlands were thrown up from the bottom of the

the ſea, their inhabitants would not be thrown up with them, and all with the ſame cuſtoms and language. Now if this immenſe part of the globe was a continent before the deluge, the inhabitants might be alike; and if the elevated parts were above the ſubſiding waters, (a circumſtance more than probable) inhabitants might be ſaved upon them, with every circumſtance of ſimilarity we find among them; for that revolution is not of ſo remote a date, but remains of antediluvian manners might exiſt at this time.

FINIS.

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